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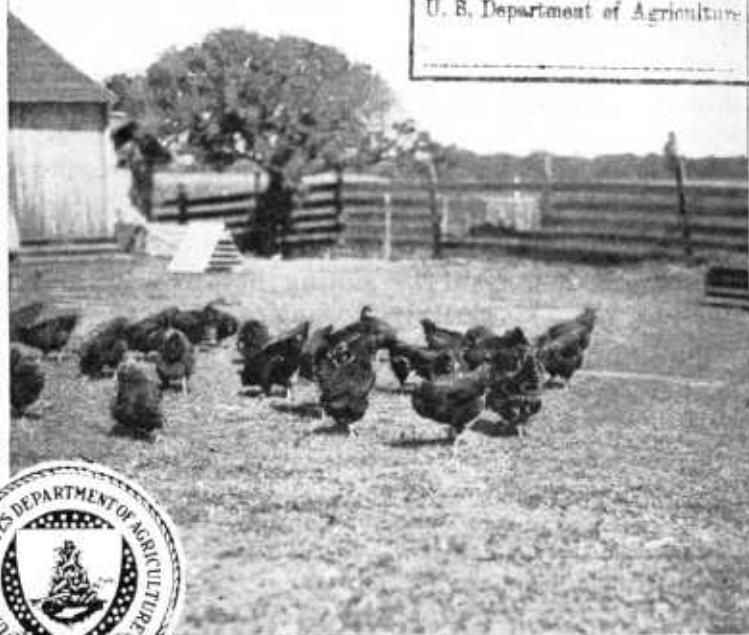
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FARM POULTRY  
RAISING

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**P**ROFITS in farm poultry raising are largely affected by the number of eggs produced during the fall and early months of winter and by the number of broilers and roasters that can be marketed when prices are highest. These objects can be accomplished best by hatching early and by having early maturing strains.

Most of the revenue from farm flocks is obtained from eggs. The laying stock should therefore be of the highest possible bred-to-lay quality. It should also be purebred and free from the major standard disqualifications.

The cost of feeding is the most important item of expense in producing eggs and market poultry. For that reason it is very important for farm poultrymen to feed efficiently.

To keep up the flock from year to year great care should be taken in selecting and managing the breeding stock. The best of attention must also be given to the incubation of the eggs and the rearing of the chicks.

Factors of management, such as housing and sanitation, are important in getting best results and should receive very careful consideration.

This bulletin supersedes Farmers' Bulletin 287, Poultry Management.

# FARM POULTRY RAISING

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## ECONOMIC POSITION OF FARM POULTRY<sup>1</sup>

A GOOD FARM FLOCK is not only an important factor in the production of staple food products, but also in increasing the revenue from the farm. Most farmers now appreciate the fact that a well-kept flock pays as well, relatively, as most other branches of farming, and as a result interest in farm poultry raising has become widespread.

Surveys conducted during recent years in a number of farm poultry raising sections have shown that the larger portion of the poultry income is obtained from eggs. This is true even in the corn and wheat sections of the United States, although the proportion of the revenue obtained from eggs in those sections is not so high as in the Atlantic coast and the Pacific coast sections. This situation indicates that egg production is relatively more important than poultry-meat production, and special attention should, therefore, be given to the improvement of farm flocks in respect to their laying ability.

During recent years, however, so much attention has been given to the question of breeding for egg production that the best interests of the poultry-meat industry may have been sacrificed, at least to some extent. However important may be the matter of developing heavy-laying strains, there will always be a large proportion of chickens other than those used for laying and breeding purposes and for which it is necessary to develop efficient means in preparing for market. In order to accomplish this the young stock must grow well during the spring and summer months and advantage should be taken of the market situation, because prices of live and dressed poultry are usually highest during the fall and early winter months.

The revenue to be obtained from the farm flock depends on success in breeding, feeding, and management. A proper combination of these factors makes for efficiency, and efficiency makes for success. The factor of breeding may be considered the basis for success, for no amount of good feeding and proper man-

<sup>1</sup> For a more detailed discussion of the economics of the poultry industry consult the following: JULL, M. A., LEM, A. R., BUNYEA, H., SLOCUM, R. R., JACKSON, D., MENDUM, S. W., LANGWORTHY, C. F., and MCATEE, W. L. THE POULTRY INDUSTRY. U. S. Dept. Agr. Yearbook, 1924: 377-456, illus. 1925.

agement will make poorly bred hens lay many eggs. Good feeding, however, is of great importance, for it is only through good feeding that a well-bred flock can respond efficiently. Lastly, proper management, which includes incubating, rearing, housing, and sanitation, is of service in obtaining maximum results from a well-bred and well-fed flock.

When laying hens are fed all the grain they will consume, as is the case at most commercial poultry plants, it is found that average Leghorn hens, and those of similar breeds, consume from 70 to 85 pounds of grain per year, whereas the Plymouth Rocks, Rhode Island Reds, Wyandottes, and similar breeds consume from 80 to 95 pounds of grain per year. In addition, both the smaller and the heavier breeds consume from 2 to 3 pounds of oyster shells and about 1 pound of grit per bird. On the average farm, however, some of the grain is obtained from the fields, and thus the cost of production is reduced somewhat. Such waste grain, insects, and other food are found by the chickens in the fields and about the yards during the spring and summer months; but, in most parts of the country the chickens do not have access to range during the late fall and winter months. The feeding of laying stock during this time is vitally important, because the profits to be made in poultry raising depend to a great extent on the number of eggs produced during the fall and winter months.

The correct basis for determining the worth of any hen as a layer should be not only the total number of eggs produced but also the time of production. Ten eggs laid in November or December are worth approximately 20 laid in April or May. According to the census, the average farm hen lays less than 60 eggs a year, principally from March to June, the season of lowest prices, and consequently the season of relatively lower profits, than at other times of the year. There is great room for improvement in increasing the production of farm flocks. A study of the trend in the average monthly farm prices from 1910 to 1924 shows that lowest wholesale egg prices prevail in April, and that there is a slight increase in July and August, with a more perceptible increase beginning in September. The highest price is reached in December, which is also the season of highest profits, provided there is good egg production. Moreover, if there is good egg production during the fall and winter, the average price per dozen for the year is increased.

Now, if the average Leghorn laying hen on a commercial poultry plant consumes from 70 to 85 pounds of grain feed in a year, it is a simple matter to determine the number of eggs, depending on their price, required to pay for the feed consumed. Likewise, in the case of the heavier breeds, such as the Plymouth Rocks and Rhode Island Reds, if the average bird on a commercial poultry plant consumes from 80 to 95 pounds of feed a year, it is not difficult to ascertain the number of eggs they must produce to pay for the feed. The important point for farmers to realize is that it takes fewer eggs from October to January to pay for a given quantity of grain than during any other time of the year. Therefore, the greater the egg production during the fall and winter the greater are the profits. What farmers should realize above all else is that, although they can not control the price of grain or the price of eggs from season to season, they can control production, at least to a considerable extent.

### EFFICIENT MARKETING INFLUENCES PROFITS

Efficient methods of production alone do not necessarily bring the highest net returns from a farm flock, because methods of marketing may be very wasteful. Before a farmer can hope to realize the greatest profits from a farm flock he must be able to market his eggs and poultry to the best advantage. This brings up the matter of the most profitable number of birds for a farmer to keep. Although the exact number is a matter for him to decide, nevertheless, a flock of 200 to 400 is particularly desirable in order that the management of the flock and the marketing of the eggs may be put on the most economical basis.

Too many farmers fail to realize that one reason why they do not receive a higher average price per dozen for their eggs is that their eggs are not graded. When small and bad eggs are marketed with the good ones the result is a lower price for all. If only a few eggs are obtained from a small flock, grading is less likely to be done than when the eggs are produced by a good-sized flock.

### SIZE OF FLOCK IMPORTANT

Maintaining a farm flock of about 200 or 400 birds enables the flock to be divided to advantage for breeding purposes. A flock of 200, for instance, can readily be divided into two units—50 yearlings and 150 pullets, and a flock of 400 into 100 yearlings and two units of 150 pullets each. The pullets are used primarily for egg production and the yearlings for breeding purposes. As explained later, yearlings are preferable to pullets as breeders because usually they lay larger eggs which hatch into bigger chicks. Moreover, the yearling hens have gone through a molt the preceding fall, and thus have had a rest prior to the breeding season, and for that reason they produce stronger chicks than pullets. A still more important reason for using yearlings as breeders is that they should be only the best birds of the pullet flock of the preceding laying year, and the continuous selection from year to year should assist greatly in improving the quality of the pullets raised each year. Farmers should give much more attention to the selection of their breeding stock every year and flock units of about 200 or 400 birds will enable them to do this to advantage.

If a farmer is unable to keep a large flock of hens, there are advantages in limiting himself to a flock large enough to supply his table with eggs and poultry meat throughout the year. This in itself is a considerable asset, because such a flock costs relatively little to feed. On the other hand, the keeping of a flock of 200 or more not only has the advantage of making production and marketing more efficient, but enables the owner to make more progress in breeding, because he has a larger number of birds to select from in mating. Also, the cost of labor per bird is reduced materially as well as cost of housing and general cost of flock management. Every farmer, therefore, who has an outlet for surplus stock and can market eggs and poultry meat and can command good prices is advised to maintain a flock of 200 or more birds.

### BREEDS AND BREEDING

A 6-pound hen laying 144 eggs in a year produces about three times her own body weight, and one laying 240 eggs produces about five times her own weight. For such hard work a hen must be vigorous and in the best of health. Vigor is indicated by a bright, full eye, bright-red comb and wattles, a well-developed body, and strong, well-placed legs. A poor layer, on the other hand, usually has a dull eye, narrow beak and head, an extremely long and narrow back, weak abdominal muscles, and sometimes weak legs. The constitutional vigor of a bird should be considered first in selecting it for the breeding pen, and poultry breeders ought to develop the ability to distinguish a good bird from a poor one.

The Department of Agriculture frequently receives requests for literature on breeds and varieties that are suited to farm poultry raising conditions in various parts of the United States. There are many such breeds, but the strain or breeding of the birds is more important than the breed or variety to which they belong. There are, however, a few breeds and varieties, such as the Barred and White Plymouth Rocks (fig. 1), Rhode Island Red, White Wyandotte, and the Single-Comb White Leghorn, that are kept to a greater extent than all other breeds and varieties combined. It is not so much that these five varieties combine economic qualities superior to other varieties, but they have gained wide popularity and have been bred to a greater extent than others.

### CLASSES AND STANDARD WEIGHTS

The different breeds and varieties of chickens of interest to farmers are described in detail in Farmers' Bulletin 1506 of the United States Department of Agriculture.<sup>2</sup> It is sufficient to mention here that all birds belonging to the American class, which includes such breeds as the Plymouth Rock, Rhode Island Red (figs. 1, 2, and 3), Wyandotte, and Jersey Black Giant, possess qualities which make them popular in the production of eggs and meat. They are birds of good size and have good fleshing qualities. They are clean legged (that is, the shanks are free of feathering), the skin, beak, and shanks are yellow,

<sup>2</sup> JULL, M. A. STANDARD BREEDS AND VARIETIES OF CHICKENS. I. AMERICAN, ASIATIC, ENGLISH, AND MEDITERRANEAN CLASSES. U. S. Dept. Agr. Farmers' Bul. 1506, 37 pp., illus. 1926.

except in the Jersey Black Giant, in which the skin is yellow and the beak and shanks are black, and all of them lay brown-shelled eggs.

The birds belonging to the Asiatic class, the most important breed of which is the Brahma, have feathered shanks, yellow skin, and lay brown-shelled eggs.

The birds belonging to the English class, which includes the Orpington, Cornish, and Sussex, show great diversity in character. All are of good size and have been noted for their excellent fleshing properties. The Orpington and Sussex have white skin, but the Cornish has yellow skin. All lay brown-shelled eggs.

The breeds belonging to the Mediterranean class, which includes the Leghorn, Ancona, Minorca, and others, also possess economic qualities which make them popular in the production of eggs and poultry meat. They are clean legged, the skin of the Leghorn and Ancona is yellow and in the Minorca it is white; all lay white-shelled eggs.

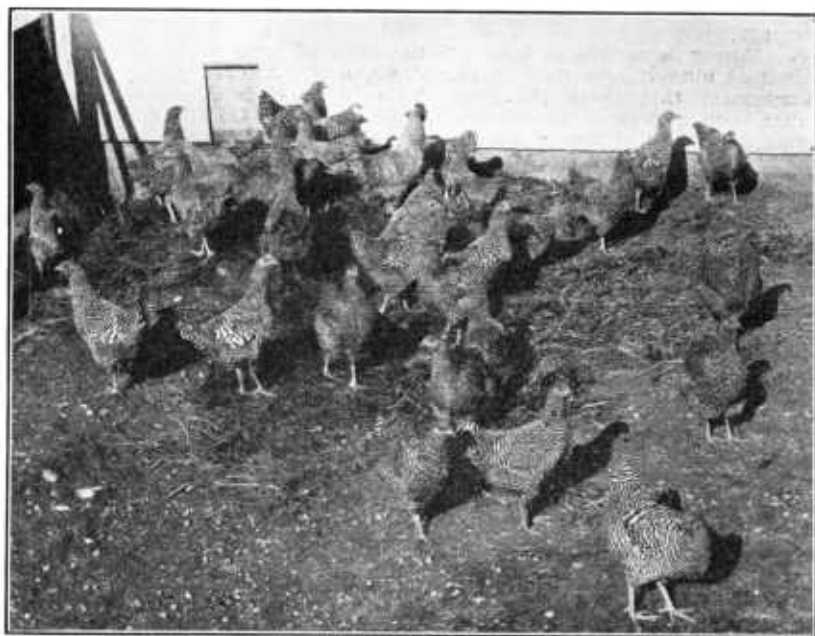


FIG. 1.—Barred Plymouth Rocks are particularly well adapted for farm poultry raising. When properly bred they make good layers. They are of good size and have good fleshing properties and their yellow skin makes them popular as a table fowl.

The standard weights of the principal breeds are given in Table 1.

TABLE 1.—Standard weights of breeds and varieties mentioned in this bulletin

Breed	Variety	Standard weights			
		Cock	Hen	Cockerel	Pullet
		Pounds	Pounds	Pounds	Pounds
Plymouth Rock	All varieties	9½	7½	8	6
Wyandotte	do.	8½	6½	7½	5½
Rhode Island Red		8½	6½	7½	5½
Jersey Black Giant		13	10	11	8
Brahma	Light	12	9½	10	8
Orpington	All varieties	10	8	8½	7
Cornish	Dark and White	10	7½	8	6
Sussex	Speckled	9	7	7½	6
Leghorn	All varieties	6	4½	5	4
Ancona		5½	4½	4½	3½
Minorca	Single-Cornish Black	9	7½	7½	6½

### BREEDING FOR EGG PRODUCTION

The ability to lay eggs is inherited. To develop an egg-laying strain requires careful selection and the adoption of a consistent breeding policy. What is most needed is the development of winter layers. The average farm hen should not only lay at least 144 eggs in a year but most of them should be laid from October to March. Not only is this necessary for profitable production but from the standpoint of breeding it is highly desirable, because heavy winter laying pullets make the best breeders as yearlings.

#### SELECTION OF FEMALE BREEDERS

The selection of female breeders is a very important matter, because with a little care the farmer can soon improve the quality of his flock materially. Selecting pullets to be used as breeders in their second year is relatively simple,

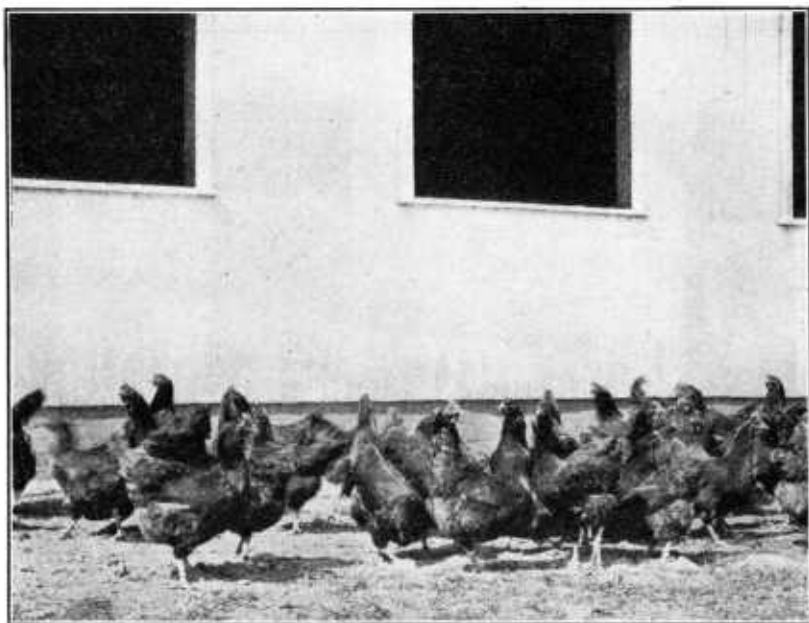


FIG. 2.—Rhode Island Reds are well suited for farm poultry raising. They are approximately 1 pound lighter than Plymouth Rocks, but possess the same good qualities as other dual-purpose chickens.

if one observes his birds closely. In the first place, females selected for breeding purposes should conform reasonably well to the standard qualifications for the breed and variety. They should show standard breed, type, and color. The more important disqualifications, such as side sprigs in single-comb varieties, stubs in clean-legged breeds, and "foreign" color markings, should not be tolerated. If proper attention is not paid to these matters, the flock may lose the distinctive features of the breed and variety to which it belongs. Female breeders should also be selected very carefully on the basis of constitutional vigor. The farmer should select females with bright, full eyes, combs and wattles of good texture, wide backs, and fairly deep bodies, and those that are well fleshed, and should reject females with dull, sunken eyes, very fine or very coarse combs and wattles, narrow backs and shallow bodies, and those that are poorly fleshed. (Fig. 4.)

In developing a laying strain four factors should be taken into consideration in observing pullets during the first laying year in order to select them properly for breeders the second year.



The first factor is that of earliness of maturity. When the pullets are put into the laying houses in the fall they should be observed carefully as to when they begin laying, which is easily determined by the relative development of the color of the comb and wattles as well as the width of spread between the pubic bones. It is a simple matter to shut the pullets in their houses about once a week during the fall months when they are beginning to lay, and then by catching the birds, preferably in a catching coop, they can be handled readily, and observations made. If they are in laying condition a cheap, colored, celluloid band should be put on one leg. Different-colored bands may be used for different times of the year, as for instance, pink bands for birds that begin to lay in October, and blue bands for those that begin in November.

The second factor in the selection of the laying hen is that of intensity of production. In breeds whose beaks and shanks are normally yellow, as in the Plymouth Rock, Leghorn, and Rhode Island Red, those pullets which lay with the greatest intensity after they begin will usually bleach out the normal color of the beaks and shanks more quickly than pullets that lay only intermittently. Therefore, if the farmer observes his flock rather closely during the fall months,

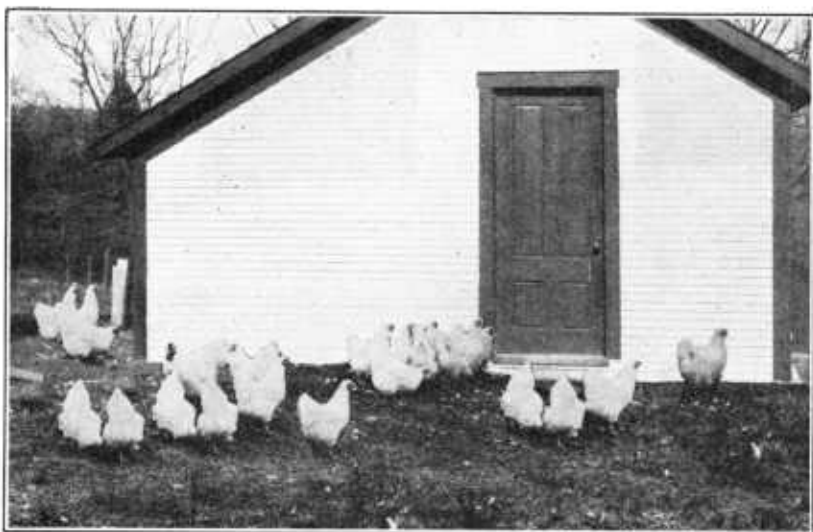


FIG. 3.—The White Wyandotte is another popular American breed suitable for farm poultry raising. Like the Barred and White Plymouth Rocks and the Rhode Island Red, it has yellow skin, beak, and shanks, and lays brown-shelled eggs

he can readily determine those birds that are laying at the heaviest rate and they can be marked with celluloid leg bands.

The third factor is that of broodiness which, however, does not usually apply in the breeding of Leghorns. Broodiness is inherited, and sometimes is responsible for materially reducing egg production. In some strains it can be eliminated after a period of years of careful selection by observing the flock carefully during the spring months and marking, with colored bands, those birds which go broody most frequently. This procedure is easily carried out, and will pay for any trouble taken in marking the most persistently broody hens.

The fourth factor to be considered in the selection of pullets to be used as breeders in the second year is that of persistence of production in late summer and fall, combined with the time and rate of molting. It has been demonstrated, for instance, that the laying pullets which molt early in their pullet laying year are usually poorer layers than the ones which molt late in the fall. Also, the early molter ceases egg production early in the summer or fall, whereas the late molter persists in laying well throughout that period and thus makes a good annual record. Differences in persistency of production among birds are also readily demonstrated by the bleached appearance of the beaks and shanks.

Farmers should realize, therefore, that these simple methods of selecting female breeders will enable them to improve the egg-laying qualities of their flocks very materially in a few years. The methods include selecting each year (1) those hens which mature early; (2) those which lay best after they begin; (3) those which seldom go broody; and (4) those which lay well throughout the late summer and fall.

#### SELECTION OF MALE BREEDERS

The selection of male breeders is relatively more important than the selection of female breeders, because the offspring of each male are more numerous than the offspring of any female, and the male constitutes one-half of the heritage given to all the offspring. As in the selection of female breeders, so male breeders should be selected on the basis of their conforming reasonably well to the standard qualifications for the breed and variety. What was said concerning the selection of females on the basis of constitutional vigor also applies equally well in the selection of male breeders.

It would be desirable, of course, to select male breeders from females that have proved to be good layers and breeders. This involves trap-nesting the

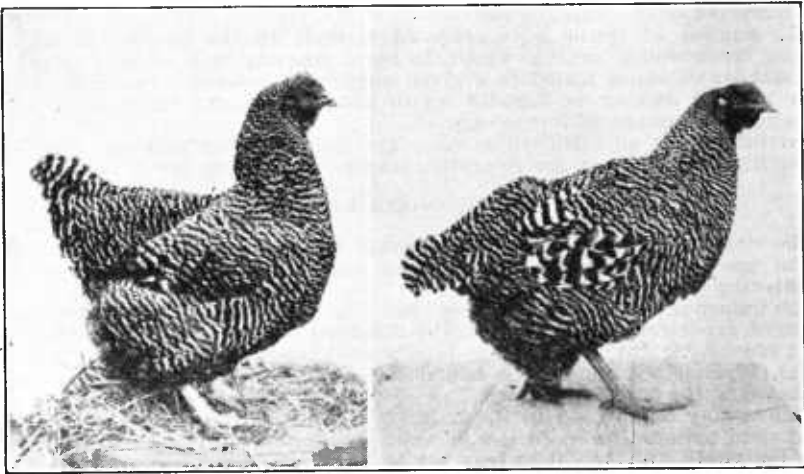


FIG. 4.—Comparison of the difference between a good type of breeding bird on the left and a poor type of bird on the right. The bird on the right has a weak constitution. The care exercised in selecting breeders determines to a large extent the quality of chicks hatched

breeding stock and pedigreeing the chicks, and is not advocated for the average farm because of the extra labor and cost. It should be possible, however, for a farmer to select good male breeders from his flock of cockerels each year by observing them closely and noting particularly those which possess the best type for breeding, have the greatest constitutional vigor, mature early, and have good handling qualities, such as fine texture of skin and good quality of bone. By carefully selecting such male breeders each year the production of the pullet flock each succeeding year should be increased steadily.

Further information on the culling of breeding and laying stock can be obtained by writing to the United States Department of Agriculture for bulletins on the subject.

#### PRODUCING HATCHING EGGS

Since the best criterion of ability as a successful poultry raiser is the number of mature chicks reared in proportion to the number of eggs set, it should be the aim of all who raise chickens to get the best possible results. Good chicks

can not be obtained from poor eggs, and success in incubation depends to a large extent on the quality of hatching eggs produced.

#### FACTORS INFLUENCING FERTILITY

The vitality of poultry used for breeding purposes is of prime importance. Without the highest degree of health, maximum fertility can not be obtained. A sick bird should never be used as a breeder, because constitutional vigor is the basis of success in poultry raising.

The general treatment given the hens affects the number of fertile eggs produced. Sanitation is essential. The fowls should be fed liberally on wholesome feed and be kept in houses which are dry and provided with plenty of fresh air. It is especially important not to overcrowd the houses and to keep the litter clean and dry during the breeding season.

The factor of time between the placing of the male birds in the breeding pen and the saving of eggs for hatching must be considered. A fertile egg may be obtained one day after the time of mating a male to a female, but in the commercial production of fertile eggs about two weeks should elapse from the time the males are placed in the breeding pen. The fertility of eggs remains at a sufficiently high percentage for about five days after the males are taken out of the breeding pen.

The number of fertile eggs produced depends on the number of matings during the breeding season, which, in turn, depends to a certain extent on the number of males mated to a given number of females. One male mated to a varying number of females up to about 15 should result in a fairly consistent percentage of fertile eggs.

Fertility is not an inherited factor. The eggs of a hen may run very high in fertility, but those of her daughters may run extremely low.

#### FACTORS INFLUENCING HATCHABILITY

The vitality of the breeders has a marked influence on the hatching quality of the eggs; birds lacking in constitutional vigor are sure to produce eggs low in hatching quality.

The influence of breed on hatching quality is most marked between extremes of breed type; for example, the active Leghorn will average better than the more phlegmatic Brahma. Among breeds of the same type, such as Plymouth Rocks, Wyandottes, and Rhode Island Reds, there is no noticeable difference in regard to the hatching quality.

Pullets may be as good in the hatching quality of their eggs as hens, but great care must be taken in the selection of mature pullet breeders in order that the vitality of the chicks may not be impaired. So far as possible, yearling hens should be used as breeders, because they usually lay large eggs which hatch into larger and stronger chicks than those laid by pullets.

Though the number of eggs hatched naturally depends on the number of fertile eggs produced, there may be no correlation between fertility and hatching quality in the fertile eggs of any hen. In other words, a hen's eggs may run very low in fertility but practically all the eggs that are fertile may hatch, whereas another hen's eggs may run very high in fertility but very few of the fertile eggs may hatch.

The hatching quality of eggs is an inherited character. This applies to both the male and female lines. In general, the sooner the eggs are incubated after being laid the better. The hatchability remains fairly constant in eggs held about 10 days. Practical experience suggests that hatching eggs should be held in a temperature of from 50 to 65° F. The best place to keep hatching eggs is a cool, well-ventilated cellar, where they should be turned occasionally; the longer they are held the more frequently they should be turned.

#### INCUBATION

The fundamental object in incubation is to get the largest possible number of chicks in proportion to the number of eggs set. The problem of incubation, therefore, is an important one, for inefficient management during incubation spoils hatching eggs of good quality, which normally would hatch into good, strong chicks. Whether hens or incubators should be used for incubation depends largely on local circumstances. Detailed information concerning the natural and artificial methods of incubation are given in Farmers' Bulletin

1538 on that subject.<sup>3</sup> If early chicks or large numbers of them are required, then the incubator becomes a necessity. Also, there are many sections of the country where the spring season is inclined to be late and the use of an incubator and coal-burning brooder enables farmers to hatch and rear chicks in time to have them develop into October and November layers. The increased use of the incubator is to be encouraged because it is an important factor in the more extensive development of the poultry industry.

It is very important to hatch the chicks as early as possible. Above all do not hatch late in the season. Inasmuch as winter-egg production is the most profitable branch of the poultry industry, and the average well-bred, general-purpose chicken does not begin laying until about seven months after being hatched, it is obvious that hatching should be done about seven months prior to October or November. Leghorns and similar breeds may be hatched about one month later than heavier breeds. The significance of hatching early is clearly demonstrated in the chart shown in Figure 5.

The hatching capacity required for the reproduction of the flock from year to year depends on the size of the flock to be reproduced as well as on the number of chickens required to be hatched at one time. In the case of the 200-bird flock, for instance, in which 150 pullets are to be placed in the laying houses each year, we shall suppose that the required number of pullets are to be brought off in two hatches. This means that at least 175 pullets should be raised to maturity to allow 25 of the poorer pullets to be culled out. Therefore a flock of 350 chicks would have to be raised, as practically one-half of the flock would be cockerels. Allowing for about 15 per cent mortality during the rearing season, 350 chicks in the fall of the year would mean that approximately 420 chicks would have to be hatched. That number hatched in two hatches would require 210 chicks for each hatch, which would mean that about 350 eggs would have to be set at each time, allowing for a 60 per cent hatch. For the two hatches, therefore, about 700 eggs would have to be set.

For those farmers who are maintaining an adult flock of 300 pullets and 100 yearlings, twice as many chicks should be hatched each time. For further information on incubation send for Farmers' Bulletin 1538.

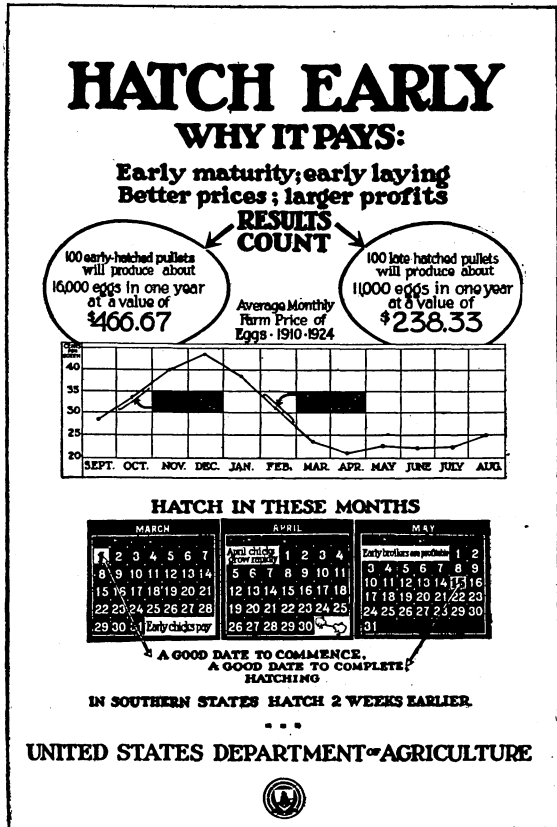


FIG. 5.—Why early hatching pays. In addition to greater egg profits, early hatched cockerels are more profitable as market poultry than those hatched late

<sup>3</sup> JULL, M. A., and LEE, A. R. INCUBATION AND BROODING OF CHICKENS. U. S. Dept. Agr. Farmers' Bul. 1538, 28 pp., illus. 1928.

**BUYING DAY-OLD CHICKS**

Because of the very rapid development of the mammoth hatchery business in the United States, more and more farmers are buying day-old chicks instead of incubating the eggs themselves. It is very important, therefore, that farmers who buy day-old chicks from commercial hatching establishments pay particular attention to the kind of hatchery from which they get their chicks. Day-old chicks of the highest quality are produced in those hatcheries where the breeding flocks supplying the eggs for the hatchery are inspected carefully and culled rigidly, using as breeders only the best birds in the flocks. The poultry plants in which the breeding flocks are maintained should be kept in sanitary condition at all times, and the eggs sent to the hatcheries should be of good size, as well as uniform in shape, shell color, and shell texture. Furthermore, the hatcheries where the incubation is carried out should be kept in strictly sanitary condition and the management of the incubator should be of the kind to produce the highest possible quality of chicks. Farmers are strongly advised to buy only good-quality chicks, because cheap chicks are frequently of poor quality and often give very unsatisfactory results.

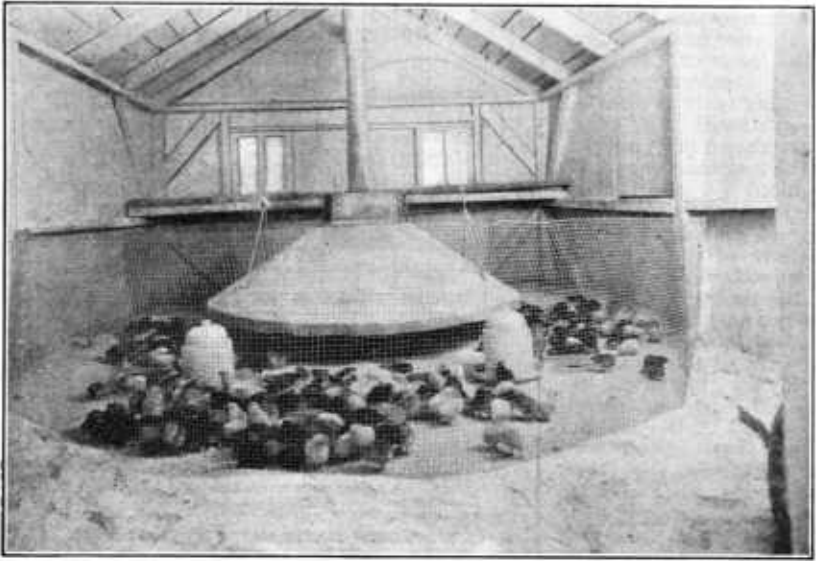


FIG. 6.—A coal-burning stove brooder is profitable equipment on many farms

**BROODING**

Given healthy and vigorous chicks as they come from the incubator, it is essential that the conditions of brooding should be of the kind that promotes the most economical growth. The most important factors in brooding, whether artificial or natural, are proper temperature, plenty of room, and sanitation. In natural brooding, however, the factor of temperature is controlled by the hen, and since a hen can accommodate only a limited number of chicks, there is little danger of overcrowding. Some farmers put from 20 to 30 chicks with one hen, but 15 is enough. It is because of these conditions in natural brooding that such chicks usually grow better than those brooded artificially. At the same time, chicks in large numbers, 150 or more, are being raised artificially with great success, particularly since the introduction of the coal-burning brooder. (Fig. 6.) The use of such a brooder reduces the cost of brooding, lessens the labor, and its use should be of particular value where there is a late spring season. There are a number of good makes on the market, and in most cases they are simple to operate and give satisfaction. They accommodate from 100 to 300 chicks each for the smaller size, and from 300 to 500 or more for the larger size.

For the farmer who raises about 400 chicks annually two brooder stoves are desirable, one for the first hatch and another for the second. For the farmer who raises about 800 chicks annually four brooder stoves are desirable. Each brooder is simply a small stove with a movable hover attached, arranged so that it can be raised or lowered according to the degree of heat required. They are not expensive to operate, and save a great deal of time in caring for the chicks.

Yards and fences are necessary for brooding the chicks in order that the old stock may be kept off the range where the chicks run. This is vitally important; otherwise, the growing chicks are liable to become contaminated with intestinal worms, body lice, and other parasites. Farmers should have plenty of land to give their growing chicks abundance of free range without interfering materially with the other crops. Brooders are often placed in houses which can be moved from one field to another; or they can be placed in different parts of the orchard each year. In this way the chicks are raised on fresh soil, are inclined to grow faster, and should keep relatively free from disease. Grow-



FIG. 7.—A suitable type of colony brooding-and-rearing house

ing chicks require plenty of shade and freedom, and under those conditions, in addition to proper methods of feeding, growth is usually satisfactory.

For further information on this subject write to the United States Department of Agriculture for Farmers' Bulletin 1538.

### REARING

Great care must be taken from the time the chicks are weaned from the heat of the brooders until they are matured to see that they develop properly. Faulty conditions may so retard growth as to affect the vitality and vigor of the stock. The chicks must be kept developing at a normal rate throughout the growing season.

The houses in which chicks are brooded and reared should promote the most efficient growth, provide ample protection from the weather, and be well ventilated. Chickens will not do well if kept in houses whose atmosphere is stuffy.

At the same time a direct draft never should pass through the house. The main object should be to make the house as comfortable as possible for all occasions.

Chicks of different ages should not be raised together. The older ones will crowd the younger, and poorly developed chickens will result. Separation of the chicks according to sex is also necessary. The time for separating varies according to the breed. Cockerels of the lighter class, such as Leghorns, should be removed from the pullets when about 8 weeks old, and cockerels of the general-purpose class, such as Plymouth Rocks, may run with the pullets a little longer.

The pullets intended for laying should be kept by themselves. They must be given proper treatment to insure good laying condition by about the middle of October or the first of November.

The growth of the pullets to maturity should proceed without interruption, because checking of growth at any stage may retard laying at maturity. Influences which are unfavorable to the development of the body will also be

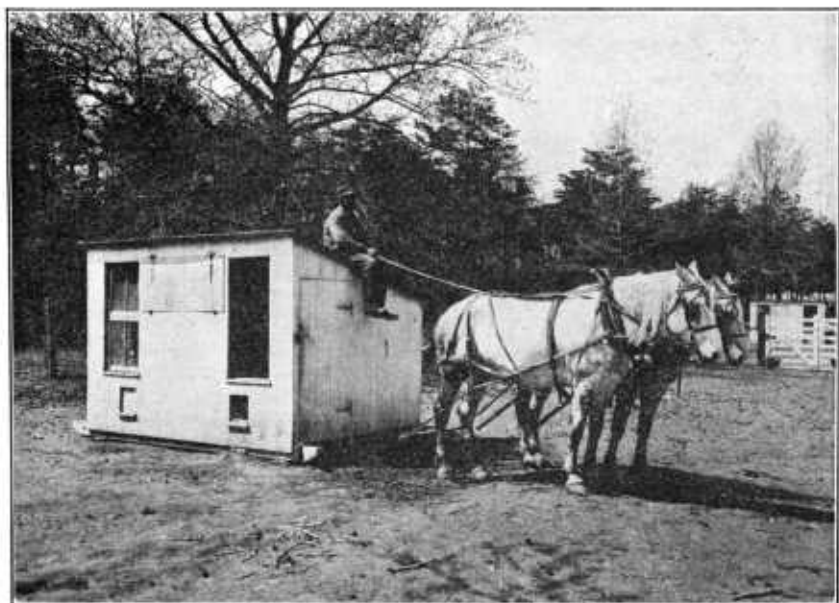


Fig. 8.—Moving a colony house to a new location

unfavorable to the proper development of the reproductive organs, on which egg production depends. Free range on clean soil and plenty of green feed and shade are essential for good growth.

Avoid disturbances to the flock. If the pullets are moved several times during the growing season it will undoubtedly retard normal growth and egg laying at maturity. They should always receive regular treatment and careful handling, for young pullets are very sensitive to strange objects and conditions.

In the fall of the year the pullets are moved from summer to winter quarters. This is necessary because the pullets should be raised on free range and on different parts of the farm each succeeding year. In order that the pullets may lay by November 1 they should be in their winter laying quarters by about September 15 or October 1. They will then have a good chance to settle down and become acquainted with their new conditions. The moving should be done as quietly as possible.

Great care should be taken to select only the best pullets for the laying pen. Do not place a diseased or a very thin pullet in the laying flock.

The cockerels which are reserved for breeding purposes should be kept separated from the pullets, but should have the same general treatment. Good growth and sound constitutions are essential in the successful rearing of breeding cockerels. The cockerels should be well developed and well matured before they are placed with the females for breeding purposes.

The chickens, usually cockerels, which are marketed at an early age (from 10 to 14 weeks), are called broilers. Since early maturity is highly desirable in order that plenty of meat may be produced, careful attention must be given to the broilers just before marketing. Cockerels to be sold as broilers are culled out of the chicken flocks at about 8 weeks of age, are kept separately, and fed on a special fattening ration. Otherwise they are treated much the same as other chickens.

The cockerels which are to be sold as roasters in the fall of the year, after separation from the pullets, should be kept on free range and made to grow as large frames as possible. Quick growth and good size are the essentials in raising good roasters.

#### CAPONIZING

In certain sections of the country, especially in the vicinity of the larger markets where there is a demand for capons, farmers may find it profitable to caponize some of their cockerels each year. Caponizing is an operation which removes the testicles of the bird, making it more docile and giving a tendency to put on flesh more readily than do cockerels. At the same time, in order to have the capons reach the largest weight attainable, they must be kept much longer than cockerels, since capons do not grow much faster than cockerels up to the time the cockerels reach maturity. Therefore, the production of capons is to be encouraged only where special market prices justify keeping the capons longer than cockerels.

Further information concerning capons may be had from Farmers' Bulletin 849 on caponizing.<sup>4</sup>

#### FEEDING CHICKS

The essential feature of feeding chicks is to obtain maximum growth with as few losses as possible. To accomplish this the chicks must be fed frequently but only a small quantity each time. It is very important not to allow chicks to overeat, especially for the first 2 or 3 weeks. At hatching time the chicks are supplied with a certain quantity of food material in the yolk sac which has been absorbed into the body just prior to hatching; therefore the chicks should not be fed anything until they are about 60 hours old. If they are fed too soon after hatching, bowel trouble may result.

After the chicks are 60 hours old they should be fed about 5 times daily for the first 2 or 3 weeks, and about 3 times daily thereafter. Several chick rations have been found to be suitable, and for the most part they are made up of scratch grains and mash. The scratch ration is usually composed of corn and wheat, and while the chicks are young the grains should be cracked fairly fine; after 3 or 4 weeks, however, the chicks can be fed whole wheat and the cracked corn can be coarser. The scratch grains should be scattered in the litter of the brooder house, feeding it 2 or 3 times daily in such a way that the chicks will have to take plenty of exercise. The mash ration is fed alternately between the scratch rations for the first week or two of its use, and then dry mash is placed in self-feeding hoppers and kept before the chicks all the time. Besides the grains, chicks need an abundant supply of green feed, which is most readily supplied by keeping the chicks on good grass range (fig. 9), but if the grass gets dry other green feed can best be supplied in the form of sprouted oats, lawn clippings, or ground alfalfa of good quality.

Milk in some form is one of the best chick feeds, and should be supplied whenever possible. The particular form in which milk is used does not seem to matter very much. Mineral feed of some kind is also important in order to supply the chicks with plenty of bone-forming material. Minerals may be supplied by adding ground limestone, bone meal, and a small quantity of salt to the ration.

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<sup>4</sup>SLOCUM, R. R. CAPONS AND CAPONIZING. U. S. Dept. Agr. Farmers' Bul. 849, 16 pp., illus. 1923. (Revised ed.)



A good chick feed for the first two weeks may be made up of a mixture of the following:

	Parts by weight
Corn meal-----	4
Bran-----	2
Rolled oats-----	2
Middlings-----	1
Sifted meat scraps-----	1

This mixture may be fed three times daily, alternated with a mixture of equal parts of finely cracked corn and cracked wheat, fed twice daily. Care should be taken not to overfeed at any time. A commercial chick feed which contains a variety of grains may be fed instead, if desired.

Chicks hatched early in the season, or when they do not get much sunshine or can not get much green feed, frequently show signs of leg weakness. A practical method of avoiding this condition has been found by giving a tested brand of cod-liver oil with the mash. The proper proportion of cod-liver oil to use is about 2 per cent of the mash ration. Do not mix up more mash with cod-liver oil than will be consumed in about two weeks, as the oil appears

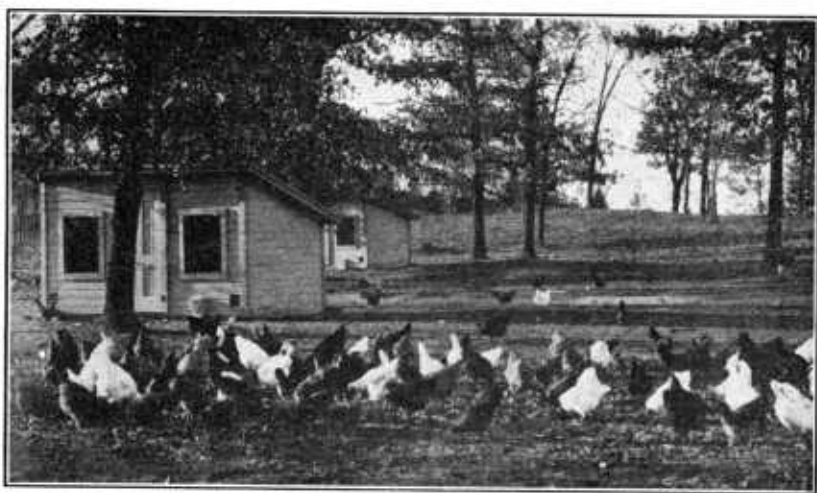


FIG. 9.—Chickens should be raised in shady quarters on clean soil with plenty of green feed. Those shown here are White Plymouth Rocks and Rhode Island Reds, both particularly well adapted for farm poultry raising, although the average farmer is advised to keep only one breed or variety.

to lose some of its value after exposure to the air. The oil kept on hand should be in tightly stoppered bottles or cans.

When the chicks are 2 weeks old, use a dry mash composed of the following:

	Parts by weight
Yellow corn meal-----	4
Bran-----	2
Middlings-----	2
Sifted meat scrap-----	1
Bone meal-----	$\frac{1}{2}$

The mash may be placed in a hopper, where it will not be wasted, and left before the chicks all the time; or it may be fed as a moist, crumbly mash once daily, feeding suitable chick grains three times a day. With only a few chickens it is less trouble to purchase the prepared chick feeds, but if a considerable number are reared it is sometimes cheaper to buy the finely cracked grains and mix them. Chick feeds may contain grains of poor quality, so that they should be examined carefully and the quality guaranteed by the dealer before they are purchased.

When the chickens are 8 or 10 weeks old, add 1 part of ground oats to the ration given above, and increase the meat scrap to  $1\frac{1}{2}$  parts.

As soon as the chicks will eat whole wheat, cracked corn, and other grains, the small-sized chick feed may be eliminated. The chickens' growth can be

hastened if they are given sour milk, skim milk, or buttermilk to drink in addition to the feeds, and milk is excellent to mix with the mash.

### FEEDING MARKET POULTRY

Whether the market chickens are killed on the farm, in fattening stations, or at live-poultry-receiving centers, they should first be properly "fattened." Fattening is a finishing process the main object of which is to improve the quality of the lean meat. The accumulation of fatty tissue, as such, is of secondary importance. When the chicken has been properly fattened much of the water in the flesh is replaced by oil so that, when cooked, the flesh becomes tender and juicy. Improvement in the quality of market chickens leads to higher prices and greater profits.

When poultry is well fattened and properly killed and dressed, there are few kinds of meat so wholesome and well flavored. Poultry meat is very similar in composition to other kinds of meat, but it is finer grained and generally more tender. In regard to digestibility, it compares well with other meats, and as it is considered more palatable it will always be largely used.

A roaster of the highest quality is one which is young, plump, and well finished. On the other hand, a thin bird is not attractive when dressed and is not appetizing when roasted. The flesh appears shrunken, the bones are prominent, and the meat is dry and tough. Plump birds are nearly always in the greatest demand, and birds of high quality yield the largest profits. Fattening, then, means heavier birds and higher prices. There is usually a difference of 5 cents or more a pound between thin and plump birds.

Many farmers in different parts of the country may not be able to fatten their poultry to advantage, because prices received may not pay for the costs of fattening. Furthermore, unless the farmer can feed his birds properly during the fattening period, he had better not try to fatten them at all. Then, again, many farmers have not sufficiently good market facilities to enable them to dispose of fattened birds profitably. Under such circumstances it is frequently advisable for the farmer not to fatten his surplus stock, but to sell direct from the range in an unfinished condition.

When farmers can market their poultry direct to the consumers or can obtain prices to justify fattening, the following information on general fattening practice should be kept in mind.

Best results are obtained by feeding all fattening birds on soft mash. The gain in weight is greater and the quality of the flesh is superior when wet mash is used than when the chickens are fed whole grain. The ground grains used to make up the mash are usually corn meal, oatmeal, low-grade flour middlings, and finely ground buckwheat. Various mixtures of these grains give satisfaction, but the actual price of each grain at any particular time determines its value as a fattening feed. With the following ration 1 pound of gain in weight may be obtained from 4 pounds of grain.

#### FATTENING RATION

	Parts by weight
Corn meal.....	3
Oatmeal or ground oats.....	1
Middlings.....	1

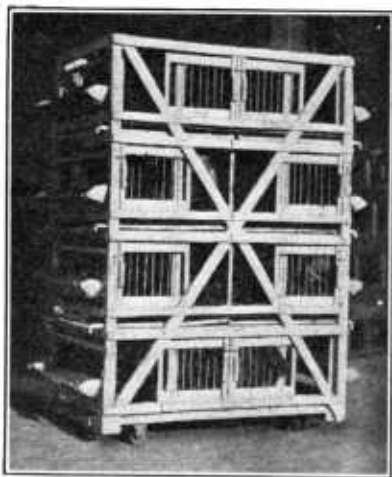


FIG. 10.—Where farmers can sell dressed poultry direct to the consumer, this type of fattening battery is satisfactory for fattening the surplus stock.

The ground grains should be mixed thoroughly and the mash mixed and fed with sour skim milk or buttermilk. Milk is excellent for fattening chickens. It tends to develop the tissues and improves the quality of the meat. The proportion of milk to the mash mixture is about 2 pounds of milk to 1 of mash. Give the birds grit once a week during the fattening period.

Great care should be taken not to feed the birds too much during the first day of the fattening period. Feed very lightly three times a day for the first two or three days, then the rest of the period give them all they will eat three times a day, but do not leave feed before them. The length of time required to fatten poultry properly depends very largely on the age and fleshing condition of the birds when they are put into the fattening pen or crate. Young birds require a longer period for fattening than old birds. Experience has shown that cockerels weighing about 4 pounds each increase 1 pound in flesh after 2 weeks of careful feeding. Experienced fatteners sometimes feed as long as three weeks, but under such circumstances feeding must be done very carefully, especially during the last week. The proper length of time to feed any particular lot of chickens can be determined best by observing the condition of fleshing from day to day and the readiness with which they consume their feed.

The best time of the year to fatten poultry is early in the fall in order that they may sell to best advantage when prices are highest. Market-poultry prices are usually highest just before Thanksgiving and Christmas. Another advantage in selling surplus stock fairly early in the season is that considerable quantities of grain and other food materials are saved.

### FEEDING LAYING STOCK

In order to get the greatest returns from the feed supplied, the laying stock must be of the highest quality from the standpoint of breeding. It is the only way to obtain a satisfactory winter egg production.

The usual advance in the price of eggs, particularly fresh eggs, during the fall of the year, is due largely to natural causes. The molting of the yearling stock leaves the pullets practically as the only source of fresh eggs at that time. Pullets, particularly of the heavier breeds, do not generally begin laying before they are well developed, and if for any reason most of them have been hatched late or have not been cared for properly during the growing season a scarcity of fresh eggs is sure to result.

The pullets should be well matured before beginning to lay and they must have well-developed bodies. Undeveloped and immature pullets are common in many farm flocks during October and November. If a bird is to lay well throughout the winter months she should begin laying about the middle of October or the first of November, just as cold weather is approaching. All pullets should be well matured by about the first of October. Pullets of good health and vitality should be the first consideration in building up a laying flock.

Maximum egg production is largely controlled by the method of feeding as well as by the nature of the feeds given. One of the prime factors in feeding is exercise. The litter in the house should be about 6 inches deep, in which the whole-grain ration should be scattered at feeding time. It is good practice to stir up the litter frequently with a fork. This prevents the straw, or whatever is used for litter, from becoming packed solid and also compels the birds to scratch for the grain. (Fig. 11.)

Laying hens should be fed a ration of scratch grains, mashes, meat feed, green feed, mineral feed, grit, and drink.

### SCRATCH RATION

The following is a good scratch ration:

	Parts by weight
Corn -----	2
Wheat -----	1
Oats -----	1

The above ration is suitable for most of the year, although it may be changed to equal parts of the three grains mentioned for the warm summer months, as corn is rather fattening. This scratch ration should be fed morning and evening in the litter on the floor. The morning feed should be a light one, to keep the hens scratching most of the morning. The evening feed of scratch grain should be sufficient to have the birds go to roost with full crops.

## MASH RATION

A mash ration should be made up of a mixture of ground grains to which should be added feeds rich in protein and some rich in minerals. The protein feeds are to make up for the deficiency of protein in the ground grains; the minerals are particularly for the purpose of supplying elements necessary for the formation of eggshells and the development of the bones and feathers. A good mash ration may be made up of the following:

	Parts by weight
Corn meal.....	40
Ground oats.....	25
Ground wheat or shorts.....	20
Meat scraps.....	15

The mash mixture may be fed either dry or moist. When fed dry it may be placed in self-feeding hoppers where the birds can help themselves at any time.

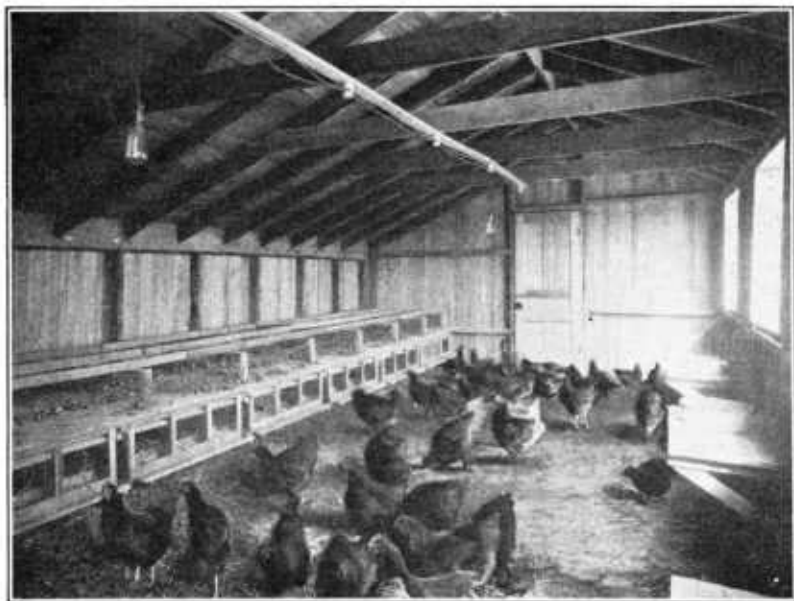


Fig. 11.—Rhode Island Red pullets in a well-lighted and well-ventilated laying house. Note the use of electric lights to lengthen the short days of winter. The use of reflectors over the lights would be advisable.

This method of feeding the mash ration saves labor and also insures all the hens getting a fair share of the feed daily. On the other hand, the mash may be fed moistened with either water or skim milk. The moistened mash is somewhat more palatable than the dry, and the birds may be induced to eat more, thus increasing egg production. At the same time, care should be taken not to overfeed on moist mash; otherwise, the birds may get too fat, this being especially true of the larger breeds. Probably the most satisfactory way of feeding the mash ration is to keep the dry mash in self-feeding hoppers all the time, and, in addition, to feed limited quantities of moist mash in V-shaped troughs every day.

Instead of using the scratch and mash rations suggested above, many farmers use commercial scratch and mash rations, of which there are many good ones on the market.

## MEAT FEED

Some kind of meat feed is desirable in order to get best results in egg production and also to keep the birds in good condition. Meat feed is necessary,

because most of the staple grains do not contain protein enough to supply hens with their normal requirements. For that reason meat scraps or fish meal are used in the dry or wet mash rations. Where milk in some form is available or can be purchased economically, it should be given daily, because it serves an excellent purpose in providing the birds with part of their protein requirements. At the same time it does not entirely take the place of meat scraps or other similar meat feeds but is good as a supplement to the regular diet.

#### GREEN FEED

Green feed should be available for laying stock at all times. If the birds are not on grass or alfalfa range, green feed can be supplied daily in the form of cabbage, or cut clover, or alfalfa. It should be possible to store cabbage and alfalfa or clover hay for use during the winter, but it is well to give the layers a daily supply of sprouted oats. Pails, small tubs, or tables with perforated holes in the bottom are excellent for sprouting purposes. Soak a small quantity of oats in a pail for 24 hours and then dump them into a second pail, or spread them on the sprouting table. Moisten them slightly and the next day dump them into a third pail or move them along the table, and do this with each supply required for a daily feeding for five days, when the germinated oats are ready for feeding. A liberal supply of green feed daily provides the hens with the required succulence in the ration, tends to keep them in better physical condition, and thus promotes egg production.

#### MINERALS

Birds need more mineral feed in proportion to their total feed requirements than most other classes of animals. This is primarily because the eggshell is largely composed of mineral matter in the form of calcium, and also because the skeleton of the bird requires considerable proportions of various kinds of minerals to keep it in repair. Mineral feed is best supplied in the form of crushed oyster shell, clamshell, or limestone, which supplies the calcium for eggshell formation. Crushed shell or limestone should be kept before the hens all the time. Bone meal may also be used to advantage, especially to supply the phosphates, and is usually mixed in with the mash ration.

#### GRIT

In order that chickens may make the most efficient use of their feed, some form of grit should be fed regularly. The feed consumed by chickens is ground in the gizzard, and in order to be ground most efficiently it should contain pieces of grit or small pieces of gravel, which can easily be provided by purchasing one of the different brands of grit on the market or by providing the birds with gravel.

#### WATER AND MILK

Fresh water should be supplied every day, and the water fountains should be kept clean and sanitary. Milk is also an excellent drink for chickens, and, besides providing some protein, as mentioned before, it also supplies minerals, a certain quantity of lactic acid, and is one of the best poultry feeds available. So far as is known, there is practically no substitute for milk in some form, and its use is advised wherever it is available or can be purchased economically. The various ways in which milk can be fed include sour skim milk, semisolid, dried skim milk, and dried buttermilk.

For further information on feeding laying hens write for Farmers' Bulletin 1541 on the subject.<sup>5</sup>

#### ARTIFICIAL LIGHTING

The use of artificial lights in the laying houses during the winter has become a common practice on many poultry farms. The lights do not increase the annual production of eggs so much as they increase the proportion of eggs during the fall and winter months, when egg prices are highest. In most parts of the United States lights are used from about the first of November to the latter part of March.

<sup>5</sup> JULL, M. A., and LEE, A. R. FEEDING CHICKENS. U. S. Dept. Agr. Farmers' Bul. 1541, 24 pp., illus. (Rev. 1929.)

The outstanding advantage in the use of artificial light is to increase feed consumption, which in turn gives rise to increased egg production at the time of the year when best prices prevail; but the excessive use of lights is not advised.

For further information on artificial lighting write to the United States Department of Agriculture.

### CULLING THE LAYING FLOCK

Laying flocks should be culled thoroughly at least once during the summer or early fall. The object of culling at that time of the year is to remove the poorest layers and to select the best for breeding purposes the next year. The method of banding birds with cheap celluloid bands, as outlined, can be taken advantage of at this time.

The banding of the birds according to their previous production, as well as the number of times they have gone broody, will assist one to pick out the poorest layers very readily and, at the same time, to select the best layers.



FIG. 12.—A farmer's son culling his flock of White Plymouth Rocks. The boys can be of great help in culling and in other work with the farm flock

In addition, there are certain other things that should be taken into consideration when the laying flock is culled.

Culling should be done very thoroughly in order that no undesirable specimens shall be left in the flock. Health and constitutional vigor are of great importance and should have first consideration in culling work. Each bird should be examined individually (fig. 12) both in respect to external appearances and from the standpoint of the color and quality of the flesh. When the bird is in good laying condition the combs and wattles are naturally bright red. Good layers have combs that are waxy in texture, whereas poor layers may have very fine or very coarse combs. In normally yellow-shanked birds, the beak and shanks of poor layers or of layers that are taking a long rest, are usually bright yellow, whereas the beak and shanks of heavy layers are usually pale yellow or white. The pubic bones of a good layer are usually thin and flexible and when the hen is in laying condition they are wide apart. In the poor layer, they are frequently thick and rigid, and when the hen is not in laying condition they are relatively close together.

The handling quality of the layers is also an important point in culling, and that of the skin serves as a very good indication of the laying ability. In a

good layer the back is usually wide, of good length, and the skin over the body is soft, pliable, and of good texture. In a poor layer the back is narrow and may be either short or long but frequently lacks good depth and the flesh over the body is usually thick, coarse, and lacking in fineness of texture.

One other important feature that should be kept in mind in culling is to note the time of the molt. Poor layers usually molt earlier than good ones. Poor-laying hens may begin molting as early as July, whereas heavy layers generally do not commence to molt before September or October. These factors should be kept in mind when culling the laying flock.

Culling is an economic feature in the proper management of the farm flock (figs. 13 and 14), because if done early enough it will save considerable cost in feeding the birds and at the same time spread the marketing of the surplus hens over a longer period than if the culled hens were all marketed late in the fall. Another distinct advantage of culling is the material improvement in the breeding quality of the flock.

#### BREAKING UP BROODY HENS

One factor of importance in maintaining high egg production during the spring and summer months is to break up broody hens as quickly as possible after they become broody. This is vitally important for two reasons: In the first place, if they are allowed to sit on fertile eggs for even a few hours, the germs will develop, which is one cause of heavy loss in marketing eggs from

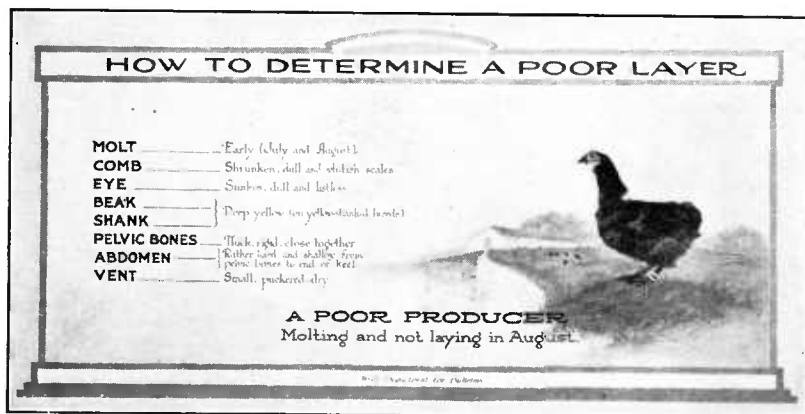


FIG. 13.—Chart showing points of a poor layer

farms. In the second place, the longer a broody hen is allowed to sit on the nest the longer it requires to get her back into laying condition and, consequently, the greater the loss in egg production.

As soon as a hen is observed to remain on the nest at night, she should be removed and placed in a broody coop where she can be properly fed and watered. The broody coop should have a slat bottom in order that the air may circulate from beneath and thus tend to keep the hen from sitting. The body will be kept cooler and the hen will get over her broodiness. While confined in the coop she should be fed and watered regularly, in order that she may get back into laying condition as quickly as possible.

For further information on this subject write to the United States Department of Agriculture for bulletins on culling.

#### HOUSING THE LAYING STOCK

There are general principles which apply in all cases of poultry-house construction, but, at the same time, local conditions determine to a large extent the exact type which will give good results.

The first essential feature in housing is comfort for the birds; unless they have comfortable quarters they can not be expected to lay well. A comfortable house provides plenty of room for the birds, is well supplied with fresh air and, at the same time, is always dry. The condition of dryness in a house depends on the circulation of fresh air. Though an abundant supply of fresh air at all times is essential, it is very important to allow no drafts to blow through the house.

One of the surest indications of an improperly ventilated poultry house is the condensation of moisture on the walls and ceilings; moisture is given off by the fowls in breathing. If this foul, moisture-laden air, which contains carbon dioxide and other injurious gases, is not carried off regularly, the atmosphere of the house becomes excessively damp, and during cold weather the dampness collects on the walls and ceilings in the form of frost.

The position of windows is a very important matter, as they are used not only to provide light but also fresh air. Too much glass space tends to make the house too warm in the daytime and too cold at night; for that reason it has been found most satisfactory to use cotton cloth in place of some of the glass. The cotton sections should be kept opened except during storms and very cold weather. During the warmer seasons of the year the windows should be open as much as possible. Glass substitutes may be used to advantage in place of glass for windows.



FIG. 14.—Chart showing points of a good layer. (Compare with fig. 13)

The second essential feature in housing is convenience. The house should be of such size and shape that any work required can be done with greatest ease. The fixtures should provide for every convenience; windows and cotton curtains should be easily adjustable, hoppers should be of sufficient size to hold a quantity of grain, and nests should be easily accessible and removable.

The third essential feature in housing is economy. A new poultry house need not be expensive but it should be durable; the more durable the house the less the per annum cost of construction per bird.

The location of the poultry house has much influence on its success. It should be so situated that it will give best results, and it should also be convenient for the attendant. It is desirable to have the house in the shelter of large buildings or trees, which serve as protection against winds. The soil on which the house is built should be naturally dry and well drained. In regard to the position of the house, it is best to have it face south or, in some sections, southeast.

Of the various materials used in the construction of poultry houses, wood is of chief importance. The wood should be well seasoned because green lumber is liable to warp, leaving cracks and gaps in the house, which cause drafts. Poultry houses are generally constructed of yellow pine. Cotton cloth is used extensively in the fronts of houses, particularly to provide air. Concrete, which is durable and sanitary, should be used for the construction of the foundation and floor. For roofing material, shingles or prepared roofing is used.



The size of a poultry house is determined by the number of birds to be housed. Small flocks require more floor space per bird than large flocks, but it is not good commercial practice to keep too many birds in one flock, from 100 to 150 being a good number. A safe working rule is to allow about 4 square feet of floor space per bird. It is a good plan to give the birds as much room as possible, keeping in mind the cost of construction.

The nearer square a house is—other things being equal—the less lumber is required. A long, narrow house is colder than a short, deep one, because it has a larger area of exposed surface and is more inclined to be drafty. The depth of a poultry house should be in proportion to its size and height, but no greater than will allow sunlight to reach nearly all parts of the building. Portable houses must be of such depth as to be movable, but the minimum depth for a stationary structure of good size should be about 15 feet. The length of a poultry house should be in keeping with the depth. If it is desired to build a long house to accommodate a large flock, then the partitions should be placed about every 20 feet, or the house will be drafty.

The shape of the roof influences the cost of construction. The steeper the pitch the greater the cost of building, particularly a shed-roof house as com-

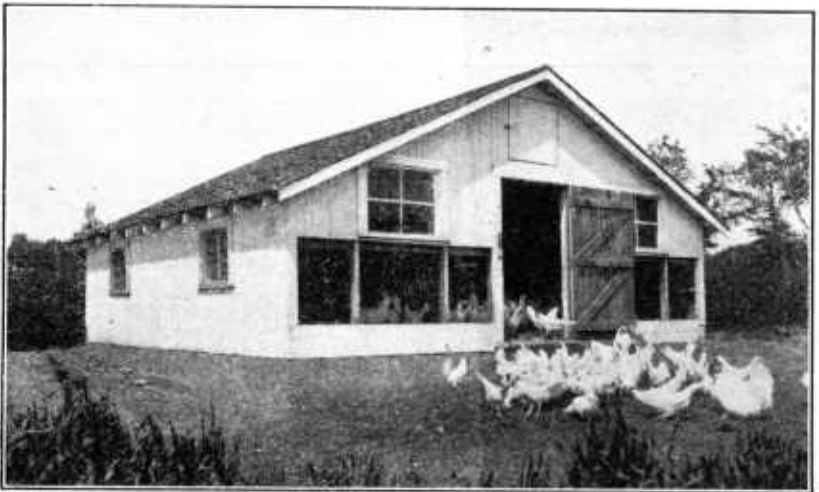


FIG. 15.—The "Missouri poultry house" has been found to be satisfactory for many sections of the country. The gable is filled with straw, which tends to keep the house dry during cold weather.

pared with a gable, or combination-roof house. On the other hand, the steeper the pitch the longer it will last. Most roofs are made about one-sixth pitch, but wooden single roofs should be one-fourth pitch. A gable roof allows a false ceiling to be put into the house, which is an advantage in many sections of the country, as straw can be packed in the gable and will help keep the house dry.

In conjunction with the housing of the laying stock, each house should have two large yards attached to it, so arranged that the fowls can be kept first in one for a considerable time, then in the other. Small, bare yards are objectionable because the birds do not get enough range or green feed and the soil soon becomes contaminated. Each yard should be plowed and cultivated occasionally and reseeded to a green crop. In this way the yards over which the laying stock ranges will always be kept sweet and clean. Soil contamination will be prevented and the possibility of having the flocks infested with worms and infected with various diseases is reduced considerably.

For further information on this subject ask for Farmers' Bulletin 1554 on poultry-house construction.<sup>6</sup>

<sup>6</sup> JULL, M. A., and LEE, A. R. POULTRY HOUSES AND FIXTURES. U. S. Dept. Agr. Farmers' Bul. 1554, 30 pp., illus. 1928.

## PREPARING EGGS FOR MARKET

Eggs represent the only article of animal food produced in a natural package—the shell; so long as the shell is unbroken the egg can not be adulterated.

The conditions under which eggs are produced on many farms can and should be greatly improved. Such improvement would result in higher average prices to the producers, a higher-grade product for the consumers, and the elimination, to a great extent, of the present enormous annual waste of the egg crop. Very often the fowls have unwholesome feed, which affects the odor and flavor of the eggs. Dirty poultry houses and dirty nests are the cause of dirty eggs. Meat spots, blood spots, and bloody eggs can not always be avoided, but they should not be sold with the rest of the eggs. Blood rings and rotten eggs are caused mostly by having the males with the females during warm weather and by broody hens sitting on the eggs. Musty and moldy eggs result from the storing of eggs in bad places. Hair splits, checks, and leakers are caused by rough handling.

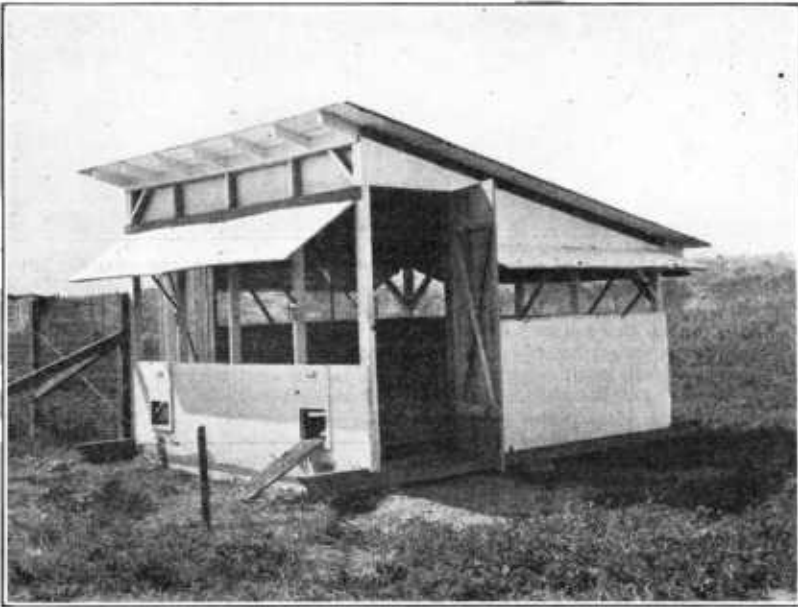


FIG. 16.—A house suitable for use in the South, as it provides plenty of ventilation during the summer. Comfort for the laying stock during the summer is as necessary as in winter

It will be noted that most of the conditions which give rise to bad eggs can be improved. If the proper improvements are made it will mean that more good eggs will be sold and much money saved, for every spoiled egg means loss. (Figs. 17 and 18.)

The following simple set of practical rules is suggested, and if they are followed much trouble with which the trade has had to contend will be avoided:

(1) Producers are strongly advised to keep the hens in comfortable, sanitary houses and give them clean nests.

(2) Eggs should be gathered regularly, twice daily in warm or very cold weather and once daily at other times of the year.

(3) The eggs should be stored in a cool place and every precaution should be taken to keep them out of the sunlight as much as possible.

(4) All male birds should be kept out of the laying flock, except during the breeding season, and those not held over for a second breeding season should be killed or sold as soon as the breeding season is over.

### PREPARING POULTRY FOR MARKET

When the birds are ready to be killed, they should be deprived of feed for about 24 hours, which will clean out feed from the crops and intestines. The dressed birds also will keep longer, and will be of better quality. During the period they are not fed they should have water, which will wash feed particles out of the digestive tract. This is a very important matter—starve before killing.



FIG. 17.—An example of careless poultry management. (Compare with fig. 18)

One of the best ways to kill a fowl is to bleed it by severing the arteries in the neck. From the ceiling of the room in which the killing is to be done the fowl is suspended by the feet at about the height of the shoulder of the plucker. Any stout cord with a short stick in the end will do to wrap around the bird's feet. In that position it is ready to be bled.

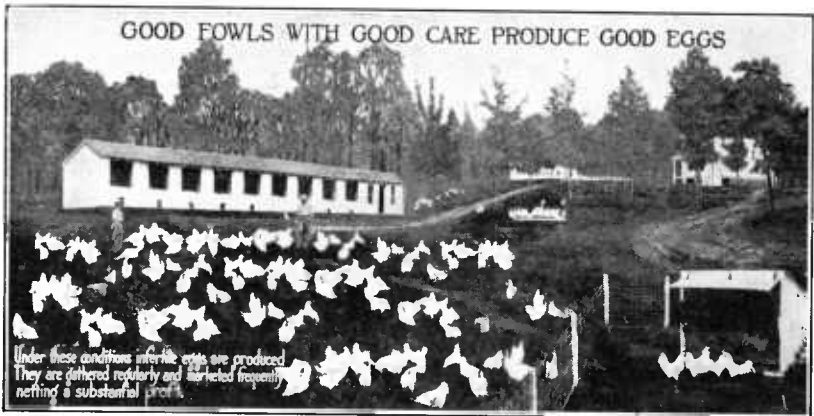


FIG. 18.—An example of good poultry management. Note separation of roosters from the flock to insure infertile market eggs

For this purpose a particular kind of killing knife is desirable. The blade of the knife is a heavy piece of steel, about 2 inches long, a quarter of an inch wide, and one-eighth of an inch thick on the back. It should be ground to a sharp point with a straight cutting edge, the slope of the point being taken from the back edge rather than from the front. The handle should be fairly stout, so that it can be grasped readily. A strong, sharp jackknife could be used to advantage.

The head of the fowl is taken in the left hand and the knife in the right hand. With the thumb and forefinger of the left hand the mouth is forced open by pressure and the knife is inserted into the mouth with the blade pointing toward the back of the head. The knife is then forced up to the juncture of the head and neck where the arteries come down on each side of the neck; these are severed and the fowl bleeds freely. For a left-handed person the operation would be performed in the opposite way.

Immediately afterwards the knife is forced into the roof of the mouth. This is done by withdrawing the knife from the juncture of the head and neck and turning it over so that the back of the knife passes along the upper beak into the groove in the roof of the mouth. It is then immediately forced into the brain cavity so that the brain is pierced. When this is done properly the bird will squawk and it will also make a convulsive movement which tends to loosen the feathers in the feather muscles. If the brain has not been properly pierced the feathers are hard to pluck and the skin is frequently torn badly.



FIG. 19.—The first operations in dry plucking



FIG. 20.—The final operations in dry plucking

As soon as the bird has been bled and the brain pierced, a blood can, weighted in the bottom, is hooked on to the lower mandible (beak) to catch the blood. It also prevents the bird from moving the body too much.

The sooner the bird is plucked the better. Experts can pluck a fowl in less than one minute. The birds are always plucked dry; it gives them a much nicer appearance and they will keep longer. (Figs. 19 and 20.)

In dry plucking, rapidity of movement is necessary. Different pluckers have different ways of plucking, but it has been found that the following order is convenient and rapid: Wings, tail, breast, body, back, legs, neck, and finishing of the wings.

As soon as the blood can has been hooked to the beak, a squeezing motion with the fingers around the neck from the base toward the head removes the feathers of the neck.

Then the wings are held firmly in the left hand, and the main wing feathers are removed with one jerk by the right hand, and the main tail feathers are given a slight twist, which should remove them with ease. The soft feathers covering the breast are removed readily by a sort of rubbing motion, rubbing the same way the feathers normally lie. The thighs and legs are easily plucked in much the same manner as the neck, and lastly the back and body of the bird

are plucked. After plucking has been completed, pinfeathers may be removed by using a dull, round-bladed knife. Care should be taken not to tear the skin; even small blemishes lower the market value of the dressed bird.

Wet plucking after scalding the chickens is much simpler than dry plucking, and is satisfactory where the dressed birds are sold locally or are not to be stored. Care should be taken not to have the water too hot (not more than about 190° F.) or the skin will be hardened or partially scalded. (Fig. 21.)

After the bird has been dressed the head and feet should be washed with a stiff brush. The vent should be squeezed, and if any feed remains in the crop it should be removed through an opening made just above the shoulders.

The head should be wrapped in parchment paper. Then the bird is put into a cool place, because it is necessary that the heat pass out of the body as soon

as possible after the fowl has been killed. The dressed birds should be hung or laid separate from each other, to allow the air to pass around all parts of the body. Proper cooling prevents bacteria from developing and tends to keep the fowls much longer.

Write for Miscellaneous Circular No. 42, "How to Pick Chickens."

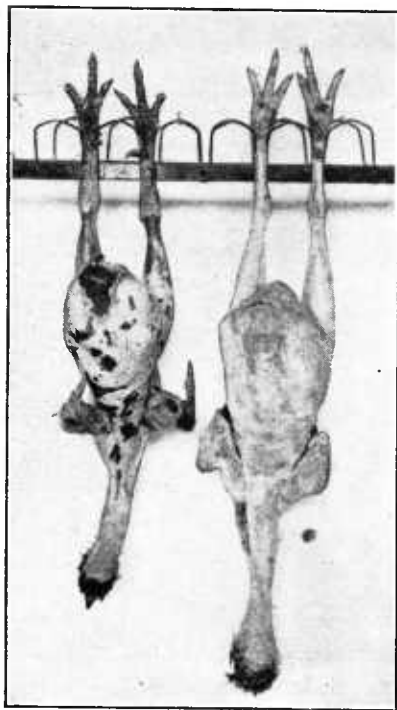


FIG. 21.—Partial cooking and breaking of the skin common to scald-picked poultry (left) gives it a less attractive appearance and a lower keeping quality than dry-picked poultry (right)

### SANITATION

The health of poultry is of great importance in its relation to results obtained in poultry raising. The first rule of good poultry keeping is to have healthy and vigorous stock. Every bird in the flock should possess a sound constitution; otherwise it is impossible to breed good stock.

Farm flocks are frequently badly infected with lice. This is unnecessary, because there is a very simple method of treating birds which will completely destroy all lice and their eggs on the fowls. If the birds are properly treated with sodium fluoride, as outlined in Farmers' Bulletin 801, "Mites and Lice on Poultry,"<sup>7</sup> which can be obtained by writing to the United States Department of Agriculture, the birds may be kept practically free from lice at all times.

In the matter of housing it has been pointed out that the house must be clean, dry, well lighted, and properly ventilated. Every poultry house and coop should be cleaned thoroughly at least once every year. To clean the poultry house, remove the litter and scrape the floor thoroughly. Then wash the floor, roosting quarters, nesting quarters, and all other parts of the building, using a scrubbing brush if necessary to remove all the dirt. To make sure that the house is cleaned thoroughly, give it another washing over all parts of the interior. After the second washing, if done properly, the house is ready to be disinfected.

### DISINFECTANTS

The following brief information concerning disinfectants and their application is taken from Farmers' Bulletin No. 1337, "Diseases of Poultry," which can be obtained by writing to the United States Department of Agriculture.<sup>8</sup>

<sup>7</sup> BISHOPP, F. C., and WOOD, H. P. MITES AND LICE ON POULTRY. U. S. Dept. Agr. Farmers' Bul. 801, 28 pp., illus. 1926. (Revised ed.)

<sup>8</sup> GALLAGHER, B. A. DISEASES OF POULTRY. U. S. Dept. Agr. Farmers' Bul. 1337, 30 pp., illus. 1927. (Revised ed.)

Good disinfectants destroy the germs of contagious diseases and some of the external parasites, such as mites, ticks, and in some cases eggs of parasitic worms. The disinfectants should be thoroughly applied to the interior of the houses, worked into all the cracks and crevices, spread over the ceiling and the floor, the roosts, dropping boards, and boxes. The feeding and drinking troughs should be disinfected by pouring boiling water into them and then drying them in the sun. Disinfectants are most easily applied to the walls and ceilings with a spray pump or with a brush. As it is difficult to keep them from coming into contact with the face and hands, the more harmless ones should be used. Ordinarily, limewash made from freshly slaked lime is excellent and its properties are well known. In the case of an actual outbreak of virulent disease it is well to add to the limewash 6 ounces of crude carbolic acid to each gallon to increase its activity as a disinfectant.

Kerosene emulsion, which is frequently used to destroy mites, may readily be converted into a disinfectant. To make the emulsion, shave half a pint of hard laundry soap into half a gallon of soft water and boil the mixture until all the soap is dissolved, then remove it to a safe distance from the fire and stir into it at once, while still hot, 2 gallons of kerosene. This makes a thick, creamy emulsion or stock mixture. When it is to be used for killing mites in the houses, 1 quart of the emulsion is mixed with 10 quarts of water. When it is to be used as a disinfectant, stir well, then add 1 pint of crude carbolic acid or crude cresol and again stir until all is well mixed.

The compound solution of cresol is one of the best disinfectants and may be purchased ready for use. It contains 50 per cent of cresol, and 1 pint of it added to 10 quarts of soft water makes a solution of proper strength to apply to the houses or to spray over the ground. A 5 per cent solution of carbolic acid (1 pint of carbolic acid to 10 quarts of water) is about equally efficacious. The choice between the two is a matter of convenience.

#### PREDATORY PESTS

Aside from the losses sustained through the ravages of various diseases as well as decreased egg production through the birds' being infested with lice and mites, there are other enemies of the farm flock against which every possible precaution should be taken. Many farmers do not realize, for instance, that a few rats will not only bore holes in the woodwork of a poultry building, but will kill young chickens and also consume considerable quantities of grain, especially if the rats are allowed to increase. Every precaution should be taken, therefore, to keep rats in check as much as possible. This can be done by having the floors and foundations of poultry houses of concrete and occasionally cleaning out the house thoroughly to make sure that no rats are nesting on the inside. Write to the department for Bulletin No. 1533, entitled "Rat Control," which discusses this subject.

With respect to hawks, crows, etc., it is not easy to give definite advice, because it is extremely difficult to keep such birds entirely away from the flocks. One helpful method is to have a shotgun handy and use it as occasion requires. Further information about crows and hawks may be obtained from the Bureau of Biological Survey, United States Department of Agriculture.

# ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

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